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H JAY SPIEGEL P.O. BOX 444 MOUNT VERNON, VA 22121			TUCKER, WESLEY J	
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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/073,335	Applicant(s) ODELL, DON	
	Examiner Wes Tucker	Art Unit 2623	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 February 2002.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-22 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 13 February 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

Claims 1, 14 and 19 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. All three independent claims cite in some form the step of "e) identifying means for identifying a highest single frequency of said image." However it is unclear from the context of the claim how such "highest single frequency of said image" is identified. There is no mention of the image in a frequency domain. It is therefore unclear as to what the actual meaning of "the highest single frequency of said image."

Claim 14 recites the limitation "frequency components of said image from f_0 to f_n " and it is unclear what said frequency components represent. There is insufficient antecedent basis for this limitation in the claim.

Claim 17 recites the limitation "mask pattern shift $Y_m = Y_d/K_m$ " and it is unclear what each variable represents. There is insufficient antecedent basis for this limitation in the claim especially with regard to the value K_m .

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-10, 13¹⁸ are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,640,241 to Ogawa in view of U.S. Patent 6,457,169 to Ross.

With regard to claim 1 Ogawa discloses determining the angular position and distance of a radiating source with respect to a detector, comprising:

- a) a radiation detector (Fig. 8, element 2);
- b) a mask spaced in front of said detector, said mask having a plurality of apertures (Fig. 8, element 11);
- c) recording means for recording an image cast onto said detector by radiation passing through said mask (Fig. 8, elements 2 and 3);
- d) computing means computing data related to said image (Fig. 8, element 3);
- f) said computing means including means for computing degree of magnification of said image on said detector as compared to size of said image as it passes through said mask (column 8, line 65 – column 9, line 3); and
- g) determining means for determining angular position of said radiation source with respect to said detector (column 8, line 67-column 9, line 3).

Ogawa does not disclose element e) identifying means for identifying a highest single frequency of said image. However frequency representations of images are well

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known in the art. One such example is a Fourier transform representation as taught by Ross (Fig. 3 and column 6, lines 32-67). Ross teaches that the Fourier representation is used to represent peaks or frequencies occurring strongly in the image data.

Therefore it is determined which frequency is the single highest in the image such as peak 30 in Fig. 3 for example. Therefore it would have been obvious to one of ordinary skill in the art to use a frequency representation of an image as taught by Ross in order to determine the peak occurring frequencies in the image.

With regard to claim 2, Ogawa and Ross disclose the system of Claim 1, and Ogawa discloses wherein said mask apertures comprise a transmissivity pattern varying in one dimension (Figs. 8 and 9). Ogawa discloses the mask apertures and an x,y coordinate plane showing the varying transmissivity pattern.

With regard to claim 3, Ogawa and Ross disclose the system of Claim 2, and Ogawa discloses wherein said one dimension comprises a Y-axis (Figs. 8 and 9). Ogawa discloses the mask apertures and an x,y coordinate plane showing the varying transmissivity pattern.

With regard to claim 4, Ogawa and Ross disclose the system of Claim 1, and Ogawa discloses wherein said detector and mask are planar and lie in parallel planes (Fig. 8).

With regard to claim 5, Ogawa and Ross disclose the system of Claim 4, and Ogawa discloses wherein said mask and detector are spaced apart by a known distance (Fig. 2 and column 2, lines 58-63 and column 3, lines 30-43). Ogawa discloses the calculation of magnification according to the position of the light source. It follows that knowing the distance between the mask and the imaging surface must inherently be known to perform said calculation. Figure 2 further shows a primary axis which in order to be useful must have known measurements.

With regard to claim 6, Ogawa and Ross disclose the system of Claim 1, however Ogawa does not disclose wherein said determining means includes means for measuring phase of a low frequency of said image to yield coarse position data. Ross discloses that the lowest fundamental frequencies are used in determining where the targets or objects of position data interest are (Fig. 3 and column 7, lines 32-38). The shape of the targets are not exact, but the location can be determined without the detail of the exact shape. Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to use low frequency data to enable coarse position data because high frequency data is only needed for more refined position or shape data.

With regard to claim 7, Ogawa and Ross disclose the system of Claim 1, and Ross discloses wherein said determining means includes means for measuring a variable frequency peak said image to yield coarse position data (Fig. 3 and column 7,

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lines 32-38). The dots in Fig. 3 represent peaks and are used to determine position data.

With regard to claim 8, Ogawa and Ross disclose the system of claim 6, and Ross discloses wherein said determining means includes means for determining phases of frequency components as well as pattern shifts (column 3, lines 27-50).

With regard to claim 9, Ogawa and Ross disclose the system of Claim 7, and Ross discloses wherein said determining means includes means for determining phases of frequency components as well as pattern shifts (column 3, lines 27-50).

With regard to claim 10, Ogawa and Ross disclose the system of claim 1, and Ogawa discloses wherein said determining means includes means for magnifying a mask pattern by a desired degree (column 2, lines 45-51 and column 3, lines 31-42). Her Ogawa discloses that the relations ship between the light position and the magnification is known (column 3, lines 30-35) and also discloses that it can be adjusted to best utilize the size of the pixel array (column 3, lines 38-42). This is interpreted as effectively controlling the amount of magnification.

With regard to claim 13, Ogawa and Ross disclose the system of Claim 1, and Ogawa discloses wherein said determining means includes means for determining distance from said radiation source to said detector (Fig. 2).

With regard to claim 14, Ogawa discloses a method of determining the angular position and distance of a radiating source with respect to a detector, including the steps of:

- a) providing a mask and detector in parallel planes spaced apart a measured distance (Fig. 8, elements 2 and 10);
- b) providing said mask with a plurality of apertures (Fig. 8, element 10);
- c) activating a point source of radiation which directs radiation through said apertures of said mask and onto said detector as an image (Fig. 8, element 4);
- d) recording said image (Fig. 8, element 2);
- f) computing magnification of said image as compared to a size of said image at said mask (column 8, line 65 – column 9, line 3);
- h) determining data resulting from pattern shifts of said image (column 3, lines 30-42);
- i) computing angle of incidence of said source with respect to said detector (column 3, lines 25-32, 38-42 and 53-57).

Ogawa does not disclose the steps of e) identifying highest frequency component of said image; and g) determining phases of frequency components of said image from f_0 to f_n . However frequency representations of images are well known in the art. One such example is the Fourier transform representations as taught by Ross (Fig. 3 and column 6, lines 32-67). Ross teaches that the Fourier representation is used to represent peaks or frequencies occurring strongly in the image data. Therefore it is

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determined which frequency is the single highest in the image such as peak 30 in Fig. 3 for example. Ross also teaches determining phases of frequency components (column 3, lines 27-50). Therefore it would have been obvious to one of ordinary skill in the art to use a frequency representation of an image as taught by Ross in order to determine the peak occurring frequencies in the image.

With regard to claim 15, Ogawa and Ross disclose the method of Claim 14, and Ross discloses wherein before said determining phases step, further including the step of using a variable frequency mask to determine variable frequency peak and coarse position (Fig. 3 and column 7, lines 32-38). Ross discloses that the lowest fundamental frequencies are used in determining where the targets or objects of position data interest are. The shape of the targets are not exact, but the location can be determined without the detail of the exact shape. The dots in Fig. 3 represent peaks and are used to determine position data. Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to use low frequency data to enable coarse position data because high frequency data is only needed for more refined position or shape data.

With regard to claim 16, Ogawa and Ross discloses the method of Claim 14, wherein, before said determining phases step, further including the step of determining the phase of a lowest frequency F_0 of said image to yield coarse position Fig. 3 and column 7, lines 32-38). Ross discloses that the lowest fundamental frequencies are used in determining where the targets or objects of position data interest are. The

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shape of the targets are not exact, but the location can be determined without the detail of the exact shape. The dots in Fig. 3 represent peaks and are used to determine position data.

With regard to claim 17, Ogawa and Ross discloses the method of Claim 14, and Ross discloses wherein said determining data step includes the steps of:

a) determining total pattern shift of said image as a sum of frequency component phase shifts (column 3, lines 35-45).

Ogawa discloses b) determining pattern shift of a magnified image Y_d (column 3, lines 30-40); and

Ogawa further discloses c) computing actual unmagnified mask pattern shift $Y_m = Y_d / K_m$. Here Ogawa discloses the conversion rate of the magnification in relation to the actual distance and mask sizes. Therefore the unmagnified mask pattern shift would be held accordingly.

The combination of Ogawa and Ross with regard to claim 17 is obvious in that Ross simply determines the pattern shift in terms of frequency phase shift domain information and Ogawa determines shift in terms of magnification/distance shift information. It follows that in the combination of these two references it would be advantageous to combine the readings of the shifts calculated in both ways in order to give a more accurate and efficient result.

With regard to claim 18, Ogawa and Ross disclose the method of Claim 14, and Ross discloses before said identifying step, further including the step of computing a Fast Fourier Transform of said image (column 5, lines 28-31).

Claims 11, 12 and 19-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of U.S. Patents 5,640,241 to Ogawa, 6,457,169 to Ross and 5,185,815 to Brandstetter.

With regard to claim 11, Ogawa and Ross disclose the system of claim 10, but do not disclose wherein said determining means further includes means for comparing a detector image to magnified mask pattern using cross-correlation. Cross-correlation is a well-known technique in the art. Brandstetter teaches that cross-correlation signals are use in order to determine match between two image signals that have been Fourier transformed. Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to use cross-correlation in order to determine a match between two image signals that have been Fourier transformed specifically the mask image signals in the combination of Ogawa and Ross.

With regard to claim 12, Ogawa and Ross and Brandstetter disclose the system of claim 11, and Ogawa discloses wherein said determining means determines pattern shift of said magnified mask pattern (column 3, lines 30-43). Ogawa discloses wherein

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the magnification or enlargement of the pattern also takes into account the displacement or shift.

With regard to claim 19, Ogawa discloses a method of determining the angular position and distance of a radiating source with respect to a detector, including the steps of:

- a) providing a mask and a detector in parallel planes spaced apart a measured distance (Fig. 8, elements 10 and 2 and Fig. 2);
- b) providing said mask with a plurality of apertures (Fig. 8, elements 11 and 12);
- c) activating a point source of radiation which directs radiation through said apertures of said mask and onto said detector as an image (Fig. 8, elements 4 and 50);
- d) recording said image (Fig. 8, elements 2 and 3);
- f) computing magnification of said image as compared to a size of said image at said mask (column 8, line 65 – column 9, line 3);
- g) magnifying said mask pattern by a magnification factor k_m (column 8, line 65 – column 9, line 3);
- i) determining angle of incidence of said source with respect to detector image to magnified mask pattern (column 3, lines 25-32, 38-42 and 53-57).

Ogawa does not disclose the steps of e) identifying highest frequency component of said image. Frequency representations of images are well known in the art. One such example is the Fourier transform representations as taught by Ross (Fig. 3 and column 6, lines 32-67). Ross teaches that the Fourier representation is used to

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represent peaks or frequencies occurring strongly in the image data. Therefore it is determined which frequency is the single highest in the image such as peak 30 in Fig. 3 for example. Therefore it would have been obvious to one of ordinary skill in the art to use a frequency representation of an image as taught by Ross in order to determine the peak occurring frequencies in the image.

Ogawa and Ross do not disclose the step of h) comparing detector image to magnified mask pattern using cross-correlation. Cross-correlation is a well-known technique in the art. Brandstetter teaches that cross-correlation signals are used in order to determine match between two image signals that have been Fourier transformed. Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to use cross-correlation in order to determine a match between two image signals that have been Fourier transformed specifically the mask image signals in the combination of Ogawa and Ross.

With regard to claim 20, Ogawa, Ross and Brandstetter disclose the method of Claim 19, and Ross discloses before said identifying step, further including the step of computing a Fast Fourier Transform of said image (column 5, lines 28-31).

With regard to claim 21, Ogawa, Ross and Brandstetter disclose the method of Claim 19, and Ogawa discloses wherein said determining angle of incidence step includes the steps of: a) determining pattern shift of magnified image (column 3, lines 30-40).

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Ogawa further discloses step b) computing actual unmagnified mask pattern shift $Y_m = Y_d / K_m$. Here Ogawa discloses the conversion rate of the magnification in relation to the actual distance and mask sizes. Therefore the unmagnified mask pattern shift would be held accordingly.

With regard to claim 22, Ogawa, Ross and Brandstetter disclose the method of Claim 19, and Ross discloses wherein said identifying step includes the step of encoding a single frequency component sequentially (column 6, lines 4-40).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Wes Tucker whose telephone number is 571-272-7427. The examiner can normally be reached on 9AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jingge Wu can be reached on 571-272-7429. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Wes Tucker

9-22-05



VIKKRAM BALI
PRIMARY EXAMINER